**Amendments to the Claims:**

This listing of claims replaces all prior versions, and listings, of the claims in the applications.

**Listing of Claims**

1. (Currently Amended) An arrayed waveguide grating (AWG) disposed on a substrate, comprising:
an input slab with a plurality of inputs and a plurality of outputs;
an output slab with a plurality of inputs and a plurality of outputs;
at least one photodiode coupled to one output of the output slab; and
a plurality of waveguides coupled between the input slab and the output slab, where each of the plurality of waveguides:
has a phase modulator in the optical path of a light signal, and
has a predetermined optical path length difference with respect to an adjacent waveguide, and
where each phase modulator has an input for receiving a control signal, and the phase modulator modifies the phase of the light signal propagating through it in response to the received control signal such that a light signal received by the at least one photodiode is optimized.

2. (canceled) An AWG according to claim 1, wherein there are at least three waveguides coupled between the input slab and the output slab.

3. (original) An AWG according to claim 1, and further comprising:
a controller with a first plurality of outputs,
where each of the first plurality of outputs is coupled to the control signal input of a respective one of the plurality of phase modulators

4. (original) An AWG according to claim 3, and further comprising a memory system coupled to the controller.

5. (Currently Amended) An AWG according to claim 4, and further comprising:
~~a plurality of photodetectors,~~
~~and~~
~~a first plurality of~~ at least one inputs to the controller,
where ~~each of the plurality of~~ the at least one photodetectors has an optical input and an electrical output,
~~each optical input of the plurality of photodetectors is coupled to a respective one of the plurality of at least one outputs of the output slab,~~
~~each of the plurality of~~ the at least one photodetectors generates an electrical signal at a respective output in response to detected light and
~~each~~ the output ~~of the plurality~~ of the at least one photodetectors is coupled to a respective ~~one of the plurality of~~ inputs to the controller.

6. (Currently Amended) An AWG according to claim 5, wherein the AWG, the controller, the memory and the ~~plurality of~~ at least one photodetectors ~~are~~ disposed on a substrate.

7. (Currently Amended) An AWG according to claim 5, and further comprising:
~~a plurality of~~ at least one temperature sensors, where ~~each of the plurality of~~ the at least one temperature sensors has an output and ~~each~~ the at least one temperature sensor is in substantial thermal proximity to the AWG, and
a at least a second ~~plurality of~~ inputs to the controller, where ~~each of~~ the at least a second ~~plurality of~~ inputs is coupled to ~~a respective one of the plurality of~~ the output of the at least one temperature sensors.

8. (Currently Amended) An AWG according to claim 7, and further comprising:
~~a plurality of~~ at least one heating elements, where ~~each of the plurality of~~ the at least one heating elements has an input and ~~each of the plurality of~~ the at least one heating elements is in substantial thermal proximity to the AWG,
and
a at least a second ~~plurality of~~ outputs from the controller, where ~~each of~~ the at least a second ~~plurality of~~ outputs is coupled to ~~a respective one of the plurality of~~ the input of the at least one heating elements.

9. (Currently Amended)An AWG according to claim 8, wherein the AWG, the controller, the memory system, ~~the plurality of~~ the at least one photodetectors, ~~the plurality of~~ the at least one temperature sensors and ~~the plurality of~~ the at least one heating elements are disposed on a substrate.

10. (original) An AWG according to claim 1, wherein each of the plurality of waveguides has at least one curved section, where the at least one curved section is substantially identical to a curved section in an adjacent waveguide of the AWG.

11. (original) An AWG according to claim 1, wherein the phase modulator is selected from one of the following: a transistor, a PIN diode and a resistor.

12. (original) An AWG according to claim 1, wherein at least one of the plurality of waveguides is selected from a group comprising: a strip loaded waveguide, a channel waveguide, a rib waveguide and a ridge waveguide.

13. (Currently Amended) The ~~optical apparatus~~ arrayed waveguide grating according to claim ~~12~~ 1, wherein ~~the~~ said arrayed waveguide grating comprises a strip loaded waveguide ~~comprises~~ comprising a strip, a slab and a low index transition layer between the strip and the slab.

14. (Currently Amended) An AWG according to claim 1, wherein the substrate is selected from the group comprising: silicon, silicon on insulator (SOI), silicon on sapphire (SOS), silicon on nothing (SON) and silicon on dielectric.

~~a first layer of monocrystalline silicon,~~
~~a second layer of dielectric material disposed on the first layer,~~

~~a third layer of monocrystalline silicon disposed on the second layer,~~
~~a fourth layer of dielectric material disposed on the third layer,~~
~~a fifth layer of monocrystalline silicon disposed on the fourth layer.~~

15. (Currently Amended) A system for phase error compensation of an AWG comprising:
a plurality of phase modulators, where each phase modulator has an input,
a controller, where the controller has ~~a plurality of~~ at least one inputs and a plurality of outputs, and each of the plurality of outputs is coupled to an input of a respective one of the plurality of phase modulators wherein the controller communicates a control signal to the respective phase modulator,
and
~~a plurality of~~ at least one photodetectors, where each of the at least one photodetectors is optically coupled to a respective one of a plurality of outputs of the AWG for receiving a light signal, and
each of the at least one photodetectors has an output coupled to a respective input of the controller.~~;~~
wherein each of the plurality of phase modulators modifies the phase of light propagating through it in response to the received control signal such that a light signal received by the at least one photodiode is optimized.

16. (Currently Amended) A system for phase error compensation of an AWG comprising:
a plurality of phase modulators, where each phase modulator has an input and each phase modulator is in an optical path of a respective one of a plurality of arrayed waveguides of the AWG, and has a signal input;
a controller with ~~an output, an~~ at least one input and a plurality of outputs,
a signal generator with an input and an output,
a light source of a selected frequency,
a modulator with an optical input, an optical output and a signal input,
~~a~~ at least one photodetector with an optical input for receiving a light signal and an electrical output,
and
a signal detector with an input and an output,
where:
~~the~~ an output of the controller is coupled to the input of the signal generator,
the output of the signal generator is coupled to the signal input of the modulator,
the input of the modulator is coupled to the light source,
the output of the modulator is coupled to a selected one of a plurality of inputs to the AWG,
the input of the at least one photodetector is coupled to a selected one of a plurality of outputs of the AWG,
the output of the at least one photodetector is coupled to the input of the signal detector,
the output of the signal detector is coupled to the at least one input of the controller,
and
~~each of the plurality of~~ an output of the controller is coupled to a respective one of the plurality of phase modulators~~.~~, wherein each of the plurality of phase modulators modifies the phase of light propagating through it in response to the received control signal such that a light signal received by the at least one photodiode is optimized.

Claims 17 - 30 are withdrawn.